



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/681,765	10/08/2003	Holger Winkelmann	8540G-000161	8289
27572 7590 01/11/2007 HARNESSE, DICKEY & PIERCE, P.L.C. P.O. BOX 828 BLOOMFIELD HILLS, MI 48303			EXAMINER ECHELMAYER, ALIX ELIZABETH	
			ART UNIT	PAPER NUMBER
			1745	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		01/11/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/681,765	<b>Applicant(s)</b> WINKELMANN ET AL.	
	<b>Examiner</b> Alix Elizabeth Echelmeyer	<b>Art Unit</b> 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 November 2006.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-33 is/are pending in the application.  
4a) Of the above claim(s) 12,24-28 and 31-33 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-11, 13-23, 29 and 30 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10-8-03</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election with traverse of the restriction between Group I, claims 1-30, and Group II, claims 31-33, in the reply filed on November 9, 2006 is acknowledged. The traversal is on the grounds that the examination of both groups will not pose an undue burden on the examiner. This is not found persuasive because the groups are patentably distinct and classified differently. There is undue burden on the examiner because the groups are classified differently and would require a different search.

MPEP 808.02.

2. The following species are elected:

- Of claims 12-16, the material of the body, AlMg<sub>3</sub> is elected (claim 16). Claim 13 is withdrawn.
- Of claims 17 and 18, the equilibrium pressure of less than about 5 atm at 25°C is elected. Both claims 17 and 18 read on this limitation.
- Of claims 22-28, the metal alloy LaNi<sub>5</sub>, which claims 22 and 23 read on, is elected. Claims 24-28 are withdrawn.

The requirement is still deemed proper and is therefore made FINAL.

3. Claims 12 and 24-28 are withdrawn. Claims 1-11, 13-23, 29 and 30 are pending and are rejected for the reasons given below.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 5-10 recite the limitation "said at least one component". There is insufficient antecedent basis for this limitation in the claim, since claim 1, from which claims 5-10 depend, recites "a component". For the purposes of examination, claims 5-10 will be interpreted to further limit "a component" from claim 1.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 17-23 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Kobayashi et al. (US Pre-Grant Publication 2002/0098396).

Kobayashi et al. teach a fuel cell system including a hydrogen storage tank, a tank containing a hydrogen-occluding alloy, and a heat exchanging means to transfer the heat generated in the hydrogen-occluding alloy containing tank to the fuel cell (Figure 1, [0018]-[0022]). The tank would inherently be made of a thermally-conductive material, since the purpose of the tank is to transfer heat.

The system also includes means for discharging hydrogen from the hydrogen-occluding alloy ([0025]).

As for claims 19-23, Kobayashi et al. teach that  $\text{LaNi}_5$  as a hydrogen-occluding alloy ([0064], [0066]).

Regarding claims 17, 18 and 29, Figure 2 of the current application indicates that  $\text{LaNi}_5$  has an equilibrium pressure for absorption of hydrogen at 25°C at less than 0.5 atm.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 2 and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al.

The teachings of Kobayashi et al. as discussed above are incorporated herein.

Regarding claim 2, Kobayashi et al. teach one tank having one channel for the occlusion of hydrogen, but fail to teach a plurality of flow channels. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a plurality of channels, since more channels would expose a greater surface area of metal to hydrogen, generating more heat for the warm-up of the fuel cell. It has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. MPEP 2144.04 (VI).

As for claims 5-10, Kobayashi et al. teach the use of water, which is electrically conductive, to transfer heat from the metal hydride tank to the fuel cell. Kobayashi et al. are silent on the arrangement of the water channels within the fuel cell. It would have been obvious to one having ordinary skill in the art at the time the invention was made to place the water channels, or heating elements, in various configurations within the fuel cell stack, since this would allow for more control over how the stack was heated, depending on where heat is required for efficient warm-up of the fuel cell. It has been held that rearranging parts of an invention involves only routine skill in the art. MPEP 2144.04 (VI).

10. Claims 3, 4, 11, 13-15 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. as applied to claims 1, 2 and 29 above, and further in view of Ishikawa et al. (US Patent 4,609,038).

The teachings of Kobayashi et al. as discussed above are incorporated herein.

With regard to claims 3, 4 and 30, Kobayashi et al. do not teach the opening and filter.

Ishikawa et al. teach hydrogen supply inlets and outlets for a heat exchanger using a hydrogen occlusion alloy (abstract; column 6 lines 37-39). Ishikawa et al. further teach pores on the outer periphery of the heat exchanger for allowing the flow of hydrogen, serving as a filter (column 6 line 56). The heat exchanger further includes fine particles of a metal hydride, for example a La-Ni alloy, for the occlusion of hydrogen (column 3 lines 6-15; column 4 lines 22-24).

It would be desirable to provide pores in the hydrogen outlet of the metal hydride tank of Kobayashi et al. to allow hydrogen to leave the tank but prevent metal hydrides from leaving and possible contaminating the fuel cell stack. It would further be desirable to use fine particles of a hydrogen occluding metal since the smaller particle size would expose a larger surface area of the material to hydrogen, generating more heat.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide pores in the hydrogen outlet of the metal hydride tank of Kobayashi et al. to allow hydrogen to leave the tank but prevent metal hydrides from leaving and possible contaminating the fuel cell stack. It also would have been obvious to use fine particles of a hydrogen occluding metal since the smaller particle size would expose a larger surface area of the material to hydrogen, generating more heat.

As for claims 11 and 13-15, Kobayashi et al. are silent on the material used for the metal hydride tank.

Ishikawa et al. teach the use of foamed aluminum to contain the metal hydride (column 5 lines 55-68; column 6 lines 1-5). Ishikawa et al. further teach that the use of foamed aluminum is desirable since it can accommodate the metal particles in its pores, allowing for a large surface area of the particles to contact the hydrogen and generate heat.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use foamed aluminum as taught by Ishikawa et al. for the metal hydride tank of Kobayashi et al. since it can accommodate the metal

Art Unit: 1745

particles in its pores, allowing for a large surface area of the particles to contact the hydrogen and generate heat.

11. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. in view of Ishikawa et al. as applied to claim 15 above, and further in view of Shreir et al. (Corrosion (3<sup>rd</sup> Edition)).

The teachings of Kobayashi et al. and Ishikawa et al. as discussed above are incorporated herein.

Kobayashi et al. in view of Ishikawa et al. fail to teach or render obvious the use of  $\text{AlMg}_3$  as the storage container of the hydrogen absorbing material.

Shreir et al. teach that  $\text{AlMg}_3$  is an alloy having very good resistance to atmospheric attack and provides very good protective anodizing.

It would be desirable to use  $\text{AlMg}_3$  in the tank of Kobayashi et al. in view of Ishikawa et al. since it would fare well in the harsh conditions of the fuel cell system, as indicated by the properties taught by Shreir et al.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use  $\text{AlMg}_3$  in the tank of Kobayashi et al. in view of Ishikawa et al. since it would fare well in the harsh conditions of the fuel cell system, as indicated by the properties taught by Shreir et al.



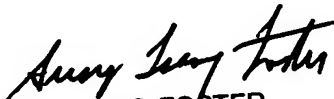
**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's trainer, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alix Elizabeth Echelmeyer  
Examiner  
Art Unit 1745

  
SUSY TSANG-FOSTER  
PRIMARY EXAMINER

aee